Illustrating Student Achievement
Using National Assessment of Educational Progress Questions:
Grade 4
Operations and Algebraic Thinking Domain

The Montana Office of Public Instruction (OPI) adopted new standards for language arts and mathematics in November 2011. The new standards will be implemented in the 2013-2014 school year with the Smarter Balanced (SBAC) assessment taking place in the spring of 2014.

This document uses National Assessment of Education Progress (NAEP) questions that seem to have a close alignment with the new standards to illustrate or suggest current levels of student achievement for the new standards. It is not intended to make any predictions about how students will do on a new assessment but may have instructional implications in terms of showing students' strengths and weaknesses. NAEP releases some items after each NAEP administration; performance data is given for the nation and states for each released item. Since 2003, every state has participated in the grade 4 and grade 8 NAEP mathematics and language arts assessments, which are given every other year. SBAC released practice tests matching the Operations and Algebraic Thinking domain have been included in this document as another example to illustrate the standards. There are no NAEP 2013 released questions as examples but these questions may be accessed via the **NAEP Questions Tool (NQT).**

This work has been made available through the **National NAEP Year Projects** (NNYP). This document parallels the work of Alaska's NAEP state coordinator. The following jurisdictions have made this information possible: Alaska, Iowa, New York, Florida, Oregon and the District of Columbia. For more information and resources, please visit:

- **Alaska Department of Education**
- **Iowa Department of Education**
- **NYC Department of Education**
- **Florida Department of Education**
- **Oregon Department of Education**
- **District of Columbia**
- **AIR: Examining the Content and Context of the Common Core State Standards: A First Look at Implications for the National Assessment of Educational Progress**

National NAEP Year Projects
Common Core

Montana
Office of Public Instruction
Denise Juneau, State Superintendent
opi.mt.gov

A note about NAEP performance: NAEP rates multiple-choice or constructed-response questions scored either right or wrong as "easy" if answered correctly by 60% or more of students, "medium" is answered correctly by 40 to 59%, or "hard" if answered correctly by fewer than 40%.

Montana Common Core Standards:

Add and subtract within 20

- **2.OA.2**. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

Represent and solve problems involving multiplication and division

- **3.OA.1.** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.
- **3.OA.2**. Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.
- **3.OA.3**. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **3.OA.4.** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?.

Solve problems involving the four operations, and identify and explain patterns in arithmetic

- **3.OA.8**. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (3.OA.8.)
- **3.OA.9.** Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.

Use the four operations with whole numbers to solve problems.

- **4.OA.1.** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
- **4.OA.2.** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
- **4.OA.3.** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Gain familiarity with factors and multiples.

- **4.OA.4.** Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Generate and Analyze Patterns

- **4.OA.5.** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit

- **4.MD.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Generalize place value understanding for multi-digit whole numbers

- **4.NBT.3.** Use place value understanding to round multi-digit whole numbers to any place.

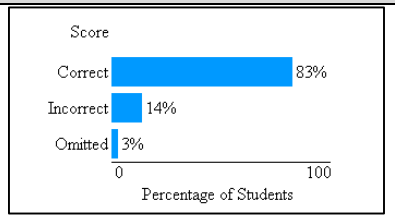
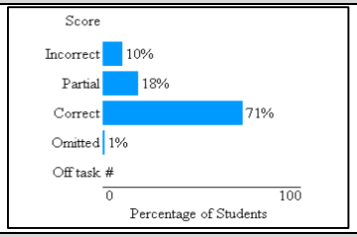
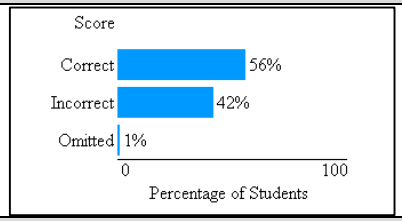
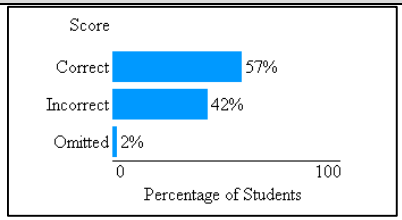
Use place value understanding and properties of operations to perform multi-digit arithmetic

- **4.NBT.5.** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Perform operations with multi-digit whole numbers and with decimals to hundredths

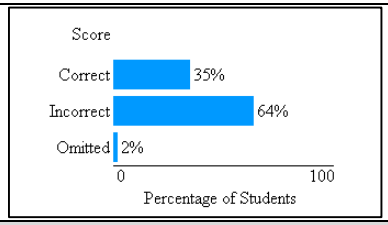
- **5.NBT.6.** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Year	Grade	Block	#	Type	Difficulty	Content Area	% Correct Nation	Item	Description	Iowa CCSS Code	Alaska CCSS Code
2003	4	6	9	MC	Medium	Number sense, properties, and operations	56.49	Item1	Identify solution method that uses multiplication	4.OA.1. & 4.OA.2.	4.OA.1. & 4.OA.2.
2003	4	6	11	MC	Medium	Number sense, properties, and operations	50.61	Item2	Given a context, identify a multiple of 6	3.OA.4	4.OA.3 & 4.OA.4
2003	4	6	12	MC	Medium	Number sense, properties, and operations	45.81	Item3	Solve a multistep word problem	3.OA.8	4.OA.3
2003	4	6	20	MC	Hard	Algebra and functions	23.89	Item4	Solve an inequality	2.OA.2	4.OA.3
2003	4	7	4	MC	Easy	Number sense, properties, and operations	83.33	Item5	Identify correct number sentence (calculator available)	3.OA.3	4.OA.1. & 4.OA.2.
2003	4	7	6	SCR	Hard	Algebra and functions	37.28	Item6	Find two possible correct solutions for problem (calculator available)	3.OA.8	4.OA.3 & 4.OA.4
2003	4	7	11	MC	Medium	Number sense, properties, and operations	56.55	Item7	Identify a correct numerical expression to model a word problem (calculator available)	3.OA.3	4.OA.1. & 4.OA.2.
2003	4	7	16	MC	Hard	Number sense, properties, and operations	34.13	Item8	Solve a problem involving an algebraic relationship (calculator available)	4.OA.3	4.OA.1. & 4.OA.2.;Also 4.NBT.5
2003	4	10	5	SCR	Easy	Number sense, properties, and operations	79.92	Item9	Write a multiplication number sentence	3.OA.1	4.OA.1. & 4.OA.2.
2003	4	10	15	MC	Hard	Number sense, properties, and operations	30.59	Item10	Estimate solution of a multi-step word problem	4.MD.2	4.OA.3; Also 4.NBT.3
2003	8	6	19	MC	Hard	Number sense, properties, and operations	38.60	Item11	Use proportional reasoning to find the distance between two towns along a line	3.OA.2	4.OA.1. & 4.OA.2.
2005	4	12	14	MC	Hard	Algebra	23.76	Item12	Identify equation to describe pattern given in table	4.OA.5	4.OA.5
2007	4	7	9	SCR	Hard	Number properties and operations	37.30	Item13	Identify all numbers having a certain factor (calculator available)	4.OA.4	4.OA.4
2007	4	7	12	MC	Hard	Algebra	18.94	Item14	Relate input to output from a table of values (calculator available)	4.OA.5	4.OA.5
2007	4	7	14	MC	Hard	Number properties and operations	20.63	Item15	Solve story problem involving multiple operations (calculator available)	5.NBT.6	4.OA.3
2007	4	9	16	SCR	Hard	Number properties and operations	36.12	Item16	Solve story problem requiring multiple operations	4.OA.3	4.OA.3
2009	4	5	12	SCR	Medium	Algebra	45.46	Item17	Extend a number pattern and write rule	4.OA.5	4.OA.5
2009	4	10	13	SCR	Hard	Algebra	35.72	Item18	Extend a pattern and explain answer	4.OA.5	4.OA.5
2011	4	8	7	MC	Medium	Number properties and operations	53.12	Item19	Solve a story problem involving multiplication (calculator available)	4.NBT.5	4.OA.1. & 4.OA.2.
2011	4	8	14	MC	Hard	Algebra	33.84	Item20	Identify the growth relationship from a table (calculator available)	4.OA.5	4.OA.5
2011	4	8	19	ECR	Hard	Number properties and operations	15.33	Item21	Solve arithmetic problem using multiple operations (calculator available)	4.OA.3	4.OA.1. & 4.OA.2.
2011	4	9	12	SCR	Hard	Number properties and operations	21.47	Item22	Describe the effect of division on size of whole numbers	4.OA.3	4.OA.3
2011	4	9	14	MC	Hard	Algebra	23.25	Item23	Recognize and extend a growing pattern	3.OA.9	4.OA.5.
2011	4	12	10	MC	Medium	Number properties and operations	47.29	Item24	Identify factors of a number	4.OA.4	4.OA.4
2011	4	12	11	SCR	Hard	Number properties and operations	24.97	Item25	Use estimation to justify a response	4.OA.3	4.OA.3
2011	4	12	13	MC	Medium	Number properties and operations	47.32	Item26	Solve story problem involving remainders	4.OA.3	4.OA.3
2011	4	12	14	MC	Hard	Geometry	29.07	Item27	Use pattern to find number of edges	4.OA.5	4.OA.5
2011	4	12	15	MC	Hard	Algebra	34.73	Item28	Identify expression that models scenario	3.OA.3	4.OA.1. & 4.OA.2.
2011	8	12	3	MC	Medium	Number properties and operations	47.53	Item29	Recognize a counterexample about prime numbers	4.OA.4	4.OA.5.
2008	age 9	M21	3	MC	Hard	Long term trend- Variables and Relationships	15.78	Item30	Identify prime number	4.OA.4	4.OA.3 & 4.OA.4
#	#	#	#	#	#	#	#	Item31	SBAC practice item 16 & 22		
#	#	#	#	#	#	#	#	Item32	SBAC practice item 2 & 20		
#	#	#	#	#	#	#	#	Item33	SBAC practice item 3 & 7		
#	#	#	#	#	#	#	#	Item34	SBAC practice item 17		

NAEP Content Area: Number properties and operations **Question**: Identify correct number sentence (calculator available). 2003. Item5 **Iowa CCSS classification**: 3.OA.3; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.	**National Data:**	**MT Data:**
Sam placed cookies on a cookie sheet to form 2 rows with 6 cookies in each row. Which of the following number sentences best describes this situation? A. 2 x 6 = ☐ B. 2 + 6 = ☐ C. 6 ÷ 2 = ☐ D. 6 -2 = ☐		**85% correct** Answer: A
NAEP Content Area: Number properties and operations **Question**: Write a multiplication number sentence. 2003. Item9 **Iowa CCSS classification**: 3.OA.1; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.	**National Data:**	**MT Data:**
Kim wants to give 7 stickers to each of her 5 friends. To find out how many stickers she needs, she writes the number sentence 7 + 7 + 7 + 7 + 7 = ☐. Write a number sentence with multiplication that she could use to find the number of stickers she needs.		**69% correct**
NAEP Content Area: Number properties and operations **Question**: Identify solution method that uses multiplication. 2003. Item1 **Iowa CCSS classification**: 4.OA.1. & 4.OA.2; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.	**National Data:**	**MT Data:**
Carla has 12 boxes that each weight the same amount. What would be a quick way for her to find the total weight of the 12 boxes? A. Add 12 to the weight of one of the boxes B. Subtract 12 from the weight of one of the boxes C. Divide the weight of one of the boxes by 12 D. Multiply the weight of one of the boxes by 12		**57% correct** Answer: D
NAEP Content Area: Number properties and operations **Question**: Identify a correct numerical expression to model a word problem (calculator available). 2003. Item7 **Iowa CCSS classification**: 3.OA.3; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.	**National Data:**	**MT Data:**
Pat has 3 fish bowls. There are 4 plants and 5 fish in each bowl. Which gives the total number of fish? A. 3 + 5 B. 3 x 4 C. 3 x 5 D. 3 + 4 + 5		**60% correct** Answer: C
NAEP Content Area: Algebra **Question**: Identify expression that models scenario. 2011. Item28 **Iowa CCSS classification**: 3.OA.3; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.	**National Data:**	**MT Data:**

Each of the 18 students in Mr. Hall's class has *p* pencils. Which expression represents the total number of pencils that Mr. Hall's class has?

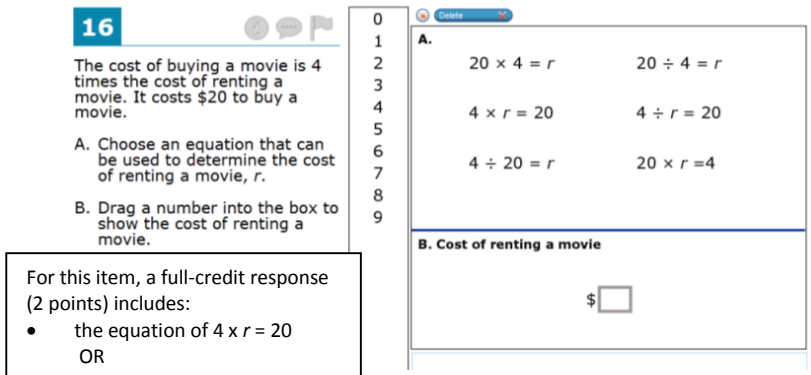
A. 18 + *p*
B. 18 – *p*
C. 18 x *p*
D. 18 ÷ *p*



32% correct

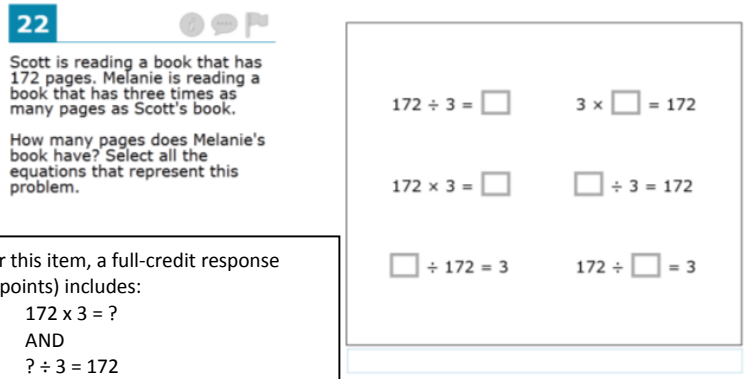
Answer: C

SBAC Practice Test Items, Item31.



For this item, a full-credit response (2 points) includes:

- the equation of 4 x *r* = 20
  OR
- 20 ÷ 4 = *r* selected
  AND
- a value of 5



For this item, a full-credit response (2 points) includes:

- 172 x 3 = ?
  AND
- ? ÷ 3 = 172
  AND
- ? ÷ 172 = 3

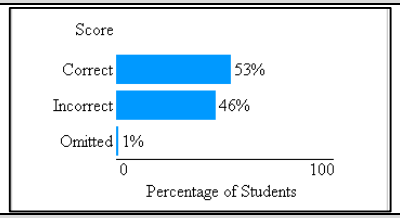
NAEP Content Area: Number properties and operations
Question: Solve a story problem involving multiplication (calculator available). 2011. Item19
Iowa CCSS classification: 4.NBT.5; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2; Also 4.NBT.5

National Data:

MT Data:

Patty expects that each tomato plant in her garden will bear 24 tomatoes. If there are 6 tomato plants in her garden, how many tomatoes does she expect?

A. 4
B. 18
C. 30
D. 144



55% correct

Answer: D

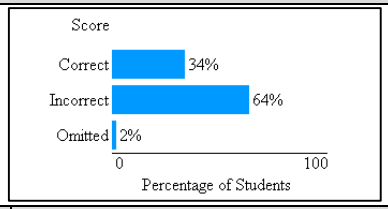
NAEP Content Area: Number sense, properties, and operations
Question: Solve a problem involving an algebraic relationship (calculator available). 2003. Item8
Iowa CCSS classification: 4.OA.3; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.

National Data:

MT Data:

In Jean's class there are twice as many boys as girls. If there are 10 girls in the class, how many boys and girls are there in the class?

A. 15
B. 20
C. 25
D. 30



38% correct

Answer: D

NAEP Content Area: Number sense, properties, and operations
Question: Solve arithmetic problem using multiple operations (calculator available). 2011. Item21

Key/Scoring Guide:

National Data:

MT Data:

Iowa CCSS classification: 4.OA.3; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.

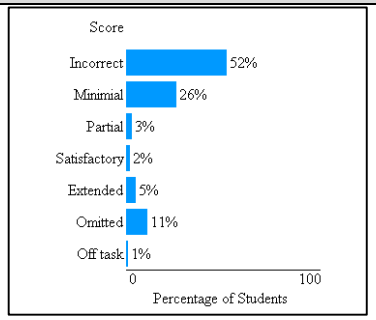
AMUSEMENT PARK

70 things to do!
34 rides
plus games
plus shows

An amusement park has games, rides, and shows.
The total number of games, rides, and shows is 70.
There are 34 rides.
There are two times as many games as shows.
How many games are there? _____
How many shows are there? _____
Use numbers, words, or drawings to show how you got your answer.
If you need more room for your work, use the space below.

Solution:
Sample Correct Response:
70-34=36 so there are 36 shows and games.
The number of games is twice the number of shows; there must be 24 games and 12 shows.

Score & Description
Extended
24 games and 12 shows with correct explanation or work
Satisfactory
Has subtraction error but has games and shows in correct ratio (2:1)
OR
Has 12 games and 24 shows with work
OR
Has 24 games and 12 shows with no work

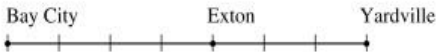


7% extended
1% satis.
5% partial
31% minimal
44% incorrect

NAEP Content Area: Number sense, properties, and operations
Question: Use proportional reasoning to find the distance between two towns along a line. 2003. Gr.4 & 8. Item11
Iowa CCSS classification: 3.OA.2; **Alaska CCSS classification**: 4.OA.1. & 4.OA.2.

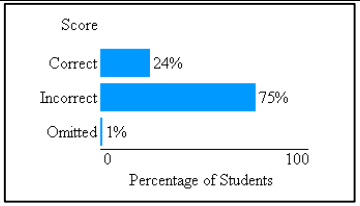
National Data:

MT Data:



On the road shown above, the distance from Bay City to Exton is 60 miles. What is the distance from Bay City to Yardville?

A. 45 miles
B. 75 miles
C. 90 miles
D. 105 miles



25% correct

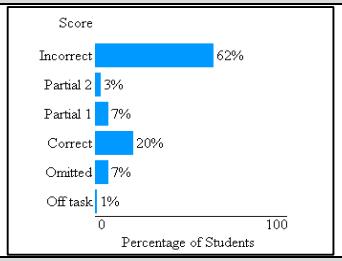
Answer: D

NAEP Content Area: Number sense, properties, and operations
Question: Use estimation to justify a response. 2011. Item25
Iowa CCSS classification: 4.OA.3; **Alaska CCSS classification**: 4.OA.3

National Data:

MT Data:

A student had to multiply 328 X 41. The student's answer was 4,598.
Use estimation to explain why this answer is not reasonable.

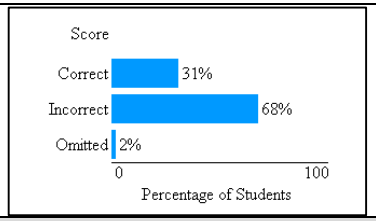
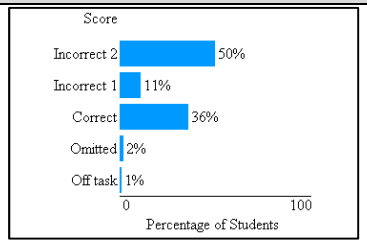
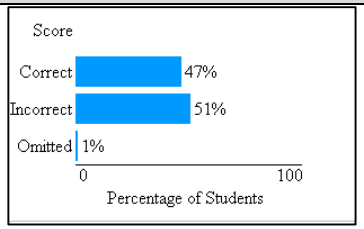
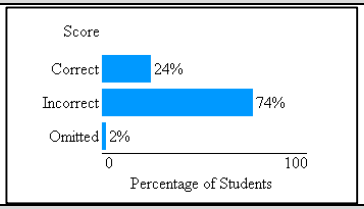


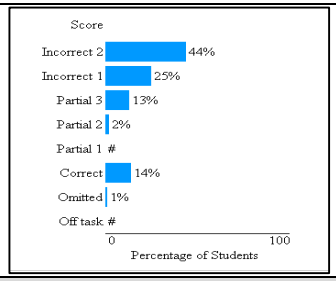
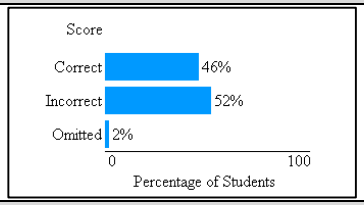
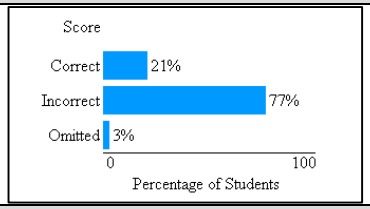
21% correct
4% Partial 2
6% Partial 1
63% Incorrect

NAEP Content Area: Number sense, properties, and operations
Question: Estimate solution of a multi-step word problem. 2003. Item10
Iowa CCSS classification: 4.MD.2; **Alaska CCSS classification**: 4.OA.3; Also 4.NBT.3

National Data:

MT Data:

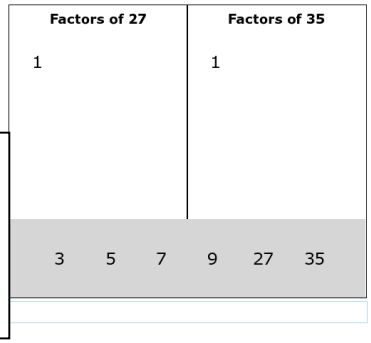
Estela wants to buy 2 notebooks that cost $2.79 each, including tax. If she has one-dollar bills and no coins, how many one-dollar bills does she need? A. 3 B. 4 C. 5 D. 6		**31% correct** Answer: D Also 4.NBT.3
NAEP Content Area: Number properties and operations **Question**: Solve story problem requiring multiple operations. 2007. Item16 **Iowa CCSS classification**: 4.OA.3; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**
Five classes are going on a bus trip and each class has 21 students. If each bus holds only 40 students, how many buses are needed for the trip? Answer: _____		**37% correct** Solution: 3 Incorrect 1: 2 Incorrect 2: any other incorrect response
NAEP Content Area: Number sense, properties, and operations **Question**: Solve story problem involving remainders. 2011. Item26 **Iowa CCSS classification**: 4.OA.3; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**
Ms. Kim has 45 stickers that she wants to give out to 6 students. The students are sitting in a circle. Ms. Kim gives out one sticker at a time and keeps going around the circle until all the stickers are gone. How many of the students will get more than 7 stickers? A. 2 B. 3 C. 5 D. 6		**47% correct** Answer: B
NAEP Content Area: Algebra and functions **Question**: Solve an inequality. 2003. Item4 **Iowa CCSS classification**: 2.OA.2; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**
What are all the whole numbers that make 8 - ☐ > 3 true? A. 0, 1, 2, 3, 4, 5 B. 0, 1, 2, 3, 4 C. 0, 1, 2 D. 5		**24% correct** Answer: B
NAEP Content Area: Number properties and operations **Question**: Describe the effect of division on size of whole numbers. 2011. Item22 **Iowa CCSS classification**: 4.OA.3 & 5.NBT.6; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**

Mr. Jones picked a number greater than 100. He told Gloria to divide the number by 18. He told Edward to divide the number by 15. Whose answer is greater? Gloria's Edward's Explain how you know this person's answer will always be greater for any number that Mr. Jones picks.		**16% correct** **16% Partial 3** **2% Partial 2**
NAEP Content Area: Number sense, properties, and operations **Question**: Solve a multistep word problem. 2003. Item3 **Iowa CCSS classification**: 3.OA.8; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**
Carl has 3 empty egg cartons and 34 eggs. If each carton holds 12 eggs, how many more eggs are needed to fill all 3 cartons? A. 2 B. 3 C. 4 D. 6		**46% correct** Answer: A
NAEP Content Area: Number properties and operations **Question**: Solve story problem involving multiple operations (calculator available). 2007. Item15 **Iowa CCSS classification**: 5.NBT.6; **Alaska CCSS classification**: 4.OA.3	**National Data:**	**MT Data:**
There will be 58 people at a breakfast and each person will eat 2 eggs. There are 12 eggs in each carton. How many cartons of eggs will be needed for the breakfast? A. 9 B. 10 C. 72 D. 116		**21% correct** Answer: B

SBAC Practice Test Items, Item32.

2

Drag each number into the correct answer space.



For this item, a full-credit (1 point) response includes:
- 3, 9, and 27 in the "Factors of 27" column AND
- 5, 7, and 35 in the "Factors of 35" column

20

Which group of numbers lists factors of **both** 24 and 36?

Ⓐ 2, 3, 4, 9
Ⓑ 2, 3, 8, 12
Ⓒ 3, 6, 9, 18
Ⓓ 3, 4, 6, 12

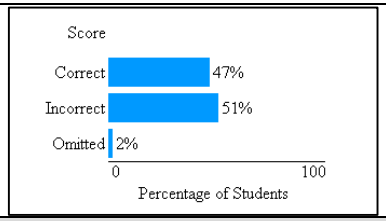
For this item, a full-credit response (1 point) includes:
- option D

NAEP Content Area: Number properties and operations **Question**: Identify factors of a number. 2011. Item24 **Iowa CCSS classification**: 4.OA.4; **Alaska CCSS classification**: 4.OA.4	**National Data:**	**MT Data:**

Which factor of 12 is missing in this list of numbers?

1, 2, 3, 4, __, 12

A. 5
B. 6
C. 8
D. 10



42% correct

Answer: B

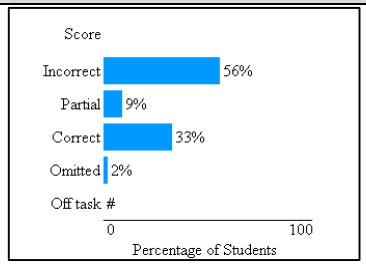
NAEP Content Area: Number properties and operations
Question: Identify all numbers having a certain factor (calculator available). 2007. Item13
Iowa CCSS classification: 4.OA.4; **Alaska CCSS classification**: 4.OA.4

National Data:

MT Data:

On the chart, circle all the numbers that have 4 as a fact

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15



31% correct

SBAC Practice Test Items, Item33.

Joe and Sally make 72 cookies for a bake sale. They will put an equal number of cookies into bags. Joe and Sally want to put more than 2 cookies but fewer than 10 cookies into each bag.

Sally says they can only put 8 cookies into 9 bags or 9 cookies into 8 bags.

Joe thinks there are more ways to put an equal number of cookies into bags.

For Part A, a full-credit response (I point) includes:

- accurately selecting one factor pair consisting of a number greater than 2 and less than 5

For example,

- 3 cookies in 24 bags OR
- 4 in 18 bags

3

Part A

Write one way that Joe and Sally could put an equal number of cookies into bags with fewer than 5 cookies per bag.

4

Part B

Write another way that Joe and Sally could put an equal number of cookies into bags with more than 5 cookies per bag.

For this item, a full-credit response (1 point) includes accurately selecting the factor pair consisting of 6 cookies and 12 bags

7

Maya is building a tower with blocks.

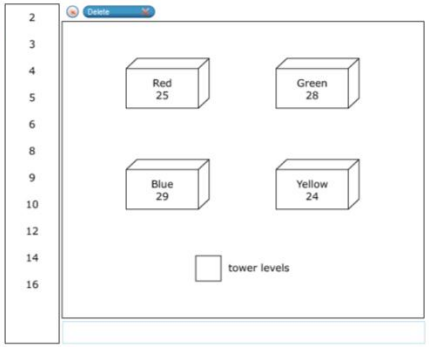
The table below shows the number and color of the blocks.

Blocks	
Color	**Number**
Red	25
Green	28
Blue	29
Yellow	24

- Maya builds a tower that uses 6 blocks for each level.
- Maya uses exactly 2 different colors.
- There are no blocks remaining of the 2 colors Maya uses.

Which color blocks does Maya use? Click on the correct two colors.

How many levels does Maya's tower have? Drag the correct number to the box.



For this item, a full-credit (2 points) includes:

- the red and blue boxes selected AND
- the value 9

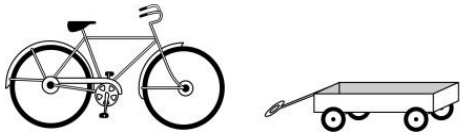
NAEP Content Area: Algebra and functions
Question: Find two possible correct solutions for problem (calculator available). 2003. Item6
Iowa CCSS classification: 3.OA.8; **Alaska CCSS classification**: 4.OA.3 & 4.OA.4

Key/Scoring Guide

National Data:

MT Data:

Question 6 refers to the situation described below.



A school yard contains only bicycles and wagons like those in the figure above.

6. On Tuesday the total number of wheels in the school yard was 24. There are several ways this could happen.
   a. How many bicycles and how many wagons could there be for this to happen?
      Number of bicycles _____
      Number of wagons _____
   b. Find another way that this could happen.
      Number of bicyles _____
      Number of wagons _____

Solution:

Any two of the following correct responses:

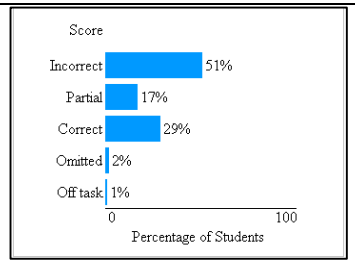
0 bicycles, 6 wagons
2 bicycles, 5 wagons
4 bicycles, 4 wagons
6 bicycles, 3 wagons
8 bicycles, 2 wagons
10 bicycles, 1 wagon
12 bicycles, 0 wagons

Score & Description

Correct
Two correct responses

Partial
One correct response, either for part a or part b
OR
same correct response in both parts

Incorrect
Incorrect responses



27% correct

SBAC Practice Test Item, Item34.

17

Javier says that all **odd** numbers greater than 2 and less than 20 are prime.

Find an odd number greater than 2 and less than 20 that is **not** prime. Explain why the number is not prime.

For this item, a full-credit response (1 point) includes:
- the numbers 9 or 15 and an explanation of how they are not prime

For example,
- 9 is not prime because it is the product of 3 and 3
  OR
- 9 is composite because 9 divided by 3 is 3
  OR
- 15 because you can multiply 3 and 5 to get it
  OR
- 15 is not prime because 3 times 5 is 15

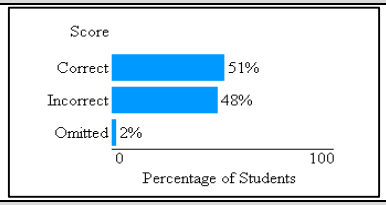
NAEP Content Area: Number properties and operations
Question: Given a context, identify a multiple of 6. 2003. Item2
Iowa CCSS classification: 3.OA.4; **Alaska CCSS classification**: 4.OA.3 & 4.OA.4

National Data:

MT Data:

Six students bought exactly enough pens to share equally among themselves. Which of the following could be the number of pens they bought?

A. 46
B. 48
C. 50
D. 52



45% correct

Answer: B

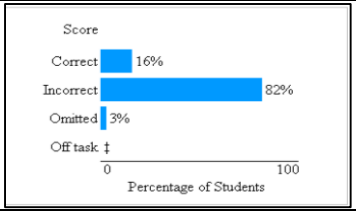
NAEP Content Area: Variables and Relationships
Question: Identify prime number. Age 9. 2008. Item30
Iowa CCSS classification: 4.OA.4; **Alaska CCSS classification**: 4.OA.3 & 4.OA.4

National Data:

MT Data:

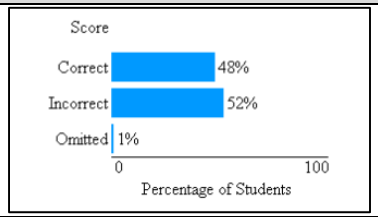
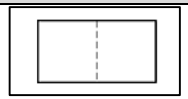
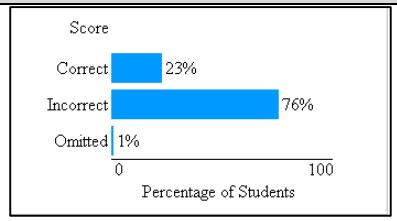
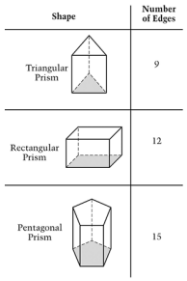
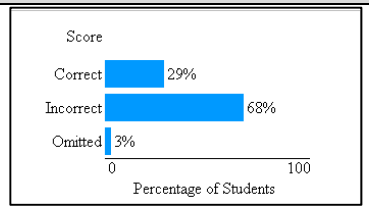
Which of these numbers is a prime number?

A. 6
B. 27
C. 67
D. 81



No state data is available for the NAEP long-term trend assessments.
Answer: C

NAEP Content Area: Number properties and operations

Question: Recognize a counterexample about prime numbers. 2011. Gr.8. Item29 **Iowa CCSS classification**: 4.OA.4; **Alaska CCSS classification**: 4.OA.5.	**National Data:**	**MT Data:**
Which of the following true statements proves that 119 is <u>not</u> a prime number? A. 17 x 7 = 119 B. 119 x 1 = 119 C. 119 is greater than 100 D. 119is an odd number E. 119 is not divisible by 3 Note: This is a grade 8 NAEP item but is given as an example because it aligns to the new mathematics standard. Performance data is for eighth graders.		**56% correct** Answer: A
<u>NAEP Content Area:</u> <u>Algebra</u> **Question**: Recognize and extend a growing pattern. 2011. Item23 **Iowa CCSS classification**: 3.OA.9; **Alaska CCSS classification**: 4.OA.5.	**National Data:**	**MT Data:**
Sam folds a piece of paper in half once. There are 2 sections.  Sam folds the paper in half again. There are 4 sections.  Sam folds the paper in half again. There are 8 sections. Sam folds the paper in half two more times. Which list shows the number of sections there are each time Sam folds the paper? A. 2, 4, 8, 10, 12 B. 2, 4, 8, 12, 24 C. 2, 4, 8, 16, 24 D. 2, 4, 8, 16, 32		**22% correct** Answer: D
<u>NAEP Content Area:</u> <u>Geometry</u> **Question**: Use pattern to find number of edges. 2011. Item27 **Iowa CCSS classification**: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.	**National Data:**	**MT Data:**
 The table shows the number of edges for each prism. What is the number of edges for a prism if the bottom face has 7 sides? A. 18 B. 20 C. 21 D. 22		**27% correct** Answer: C

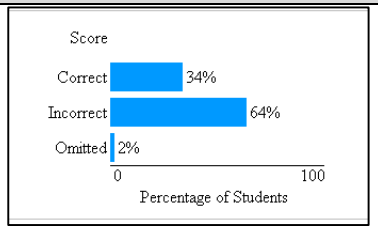
NAEP Content Area: Algebra
Question: Identify the growth relationship from a table (calculator available). 2011. Item20
Iowa CCSS classification: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.

National Data:

MT Data:

Every 30 minutes Dr. Kim recorded the number of bacteria in a test tube.

Time	Number of Bacteria
1:00 P.M.	600
1:30 P.M.	1,190
2:00 P.M.	2,390
2:30 P.M.	4,800



34% correct

Answer: C

Which best describes what happened to the number of bacteria every 30 minutes?

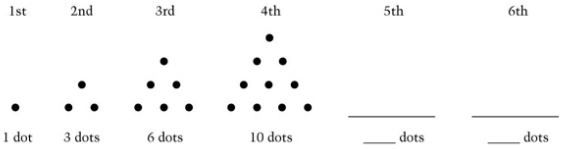
A. The number of bacteria increased by 500.
B. The number of bacteria increased by 1,000.
C. The number of bacteria doubled.
D. The number of bacteria tripled.

NAEP Content Area: Algebra
Question: Extend a pattern and explain answer. 2009. Item18
Iowa CCSS classification: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.

Key/Scoring Guide:

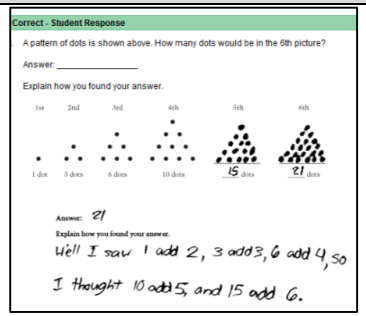
National Data:

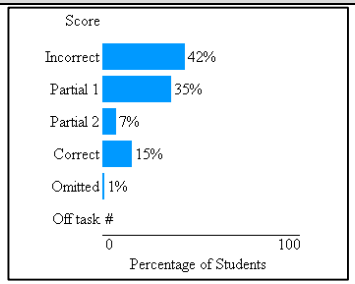
MT Data:



A pattern of dots is shown above. How many dots would be in the 6th picture?

Answer: _____
Explain how you found your answer.





15% correct

NAEP Content Area: Algebra
Question: Extend a number pattern and write rule. 2009. Item17
Iowa CCSS classification: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.

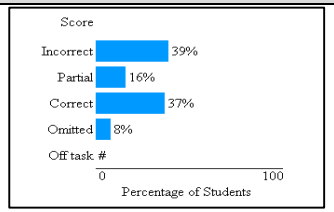
National Data:

MT Data:

Write the next two numbers in the number pattern.

1 6 4 9 7 12 10 ____ ____

Write the rule that you used to find the two numbers you wrote.



43% correct

NAEP Content Area: Algebra
Question: Relate input to output from a table of values (calculator available). 2007. Item14
Iowa CCSS classification: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.

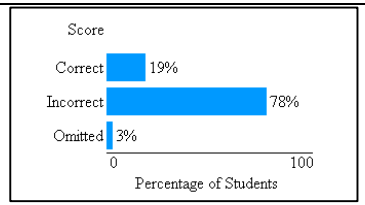
National Data:

MT Data:

In	Out
2	5
3	7
4	9
5	11
15	31
38	

The table shows how the "In" numbers are related to the "Out" numbers. When 38 goes in, what number comes out?

A. 41
B. 51
C. 54
D. 77



19% correct

Answer: D

NAEP Content Area: Algebra
Question: Identify equation to describe pattern given in table. 2005. Item12
Iowa CCSS classification: 4.OA.5; **Alaska CCSS classification**: 4.OA.5.

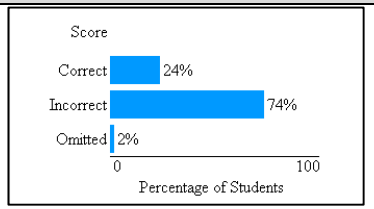
National Data:

MT Data:

□	△
4	9
5	11
6	13
7	15

Which rule describes the pattern shown in the table?

A. □ + 5 = △
B. □ + □ = △
C. □ + □ + 1 = △
D. □ + □ + 2 = △



21% correct

Answer: C